BULLETIN 367

The Portable Farm Elevator

. . . make it a helper only

Agricultural Extension Service
The Ohio State University

The Portable Farm Elevator-

. . . make it a helper only

by

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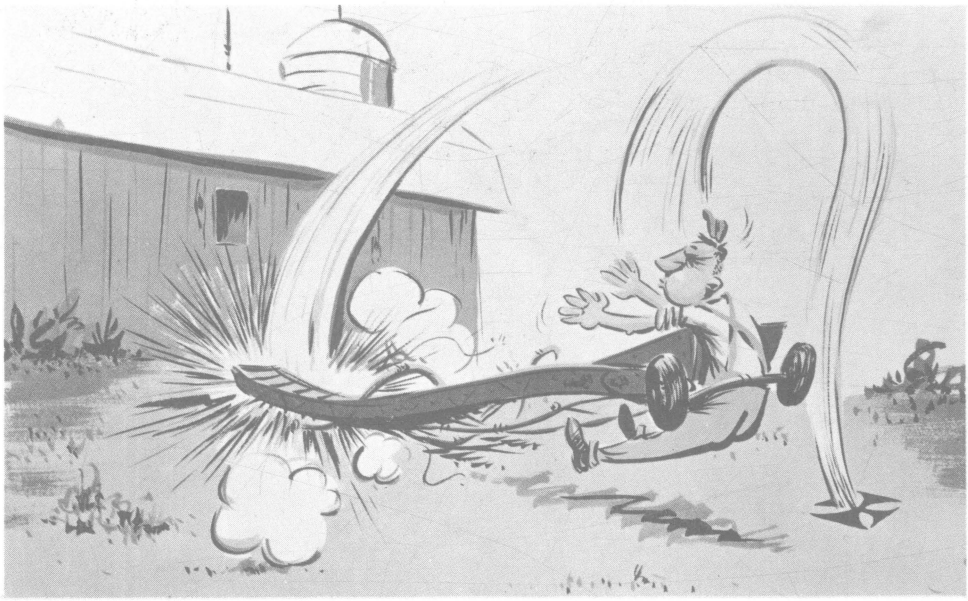
Handling grain, hay or ensilage is much easier when you use a portable elevator. Few farm machines will contribute so much to reducing the "back work" around a farm. But, these mechanical hired hands have become a principal source of farm accidents.

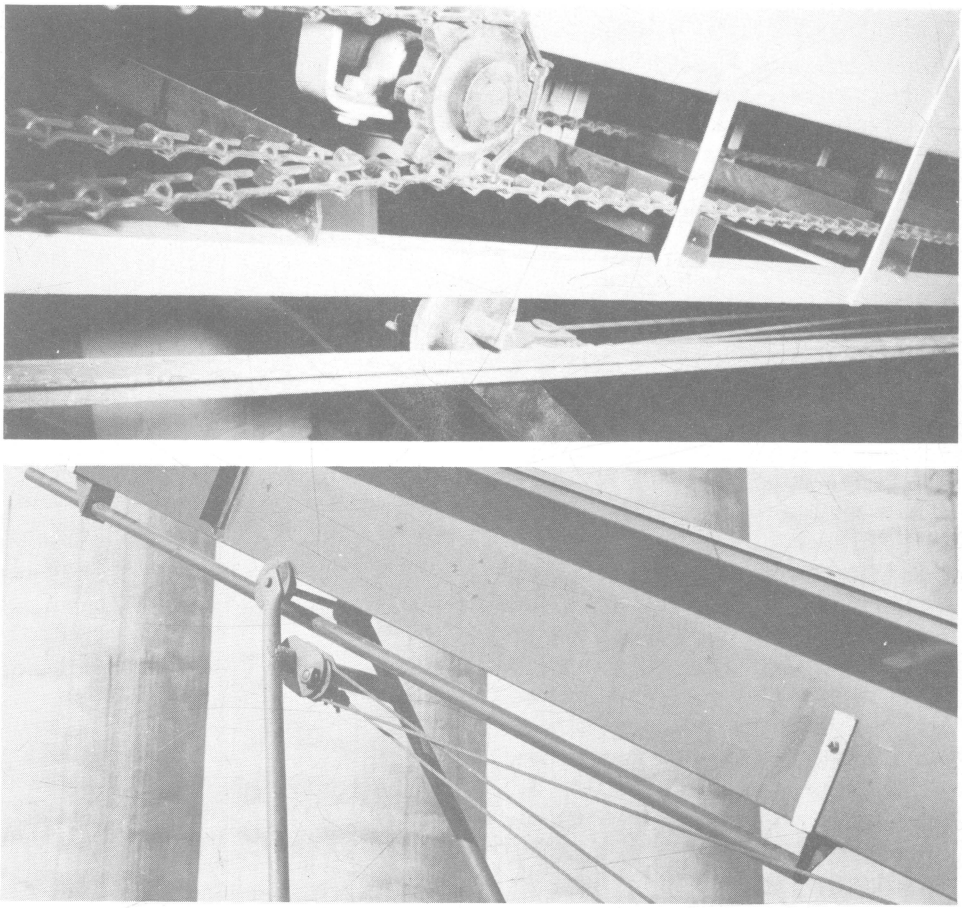
A recent study among Ohio farm people revealed 498 injuries resulting from elevator accidents during one season. Five of these were fatal. Many of us recognize that complex farm machines can be dangerous, and require cautious operation. But, we seem to take too much for granted when it comes to safety with elevators. Although elevators are quite simple mechanically, the study revealed that they cause about *twice as many injuries* as do corn pickers, grain combines, or hay balers.

You must recognize several trouble sources, if you wish to avoid elevator accidents. *Check yours* now, while you have time —*eliminate the hazards!*

Prevent Undercarriage Collapse

The most common cause of fatal accidents with portable elevators is undercarriage collapse. Death results when an operator is crushed by the machine.





Safety tracks are shown on two types of farm elevators.

Figure 1 is a sketch of the undercarriage design of a typical portable elevator which is subject to collapsing. The steps leading to collapse are shown in Figure 2.

Occasionally, an elevator is upended — usually unintentionally, but sometimes intentionally. This is the first step toward collapse. Several common practices can lead to accidental upending. If the machine is being moved forward with the trough raised and one of the wheels strikes an obstruction, the person, or persons, pushing it may lose control. The force, due to motion, tends to create a top-heavy condition.

Upending can occur also when a man moving an elevator, with trough raised, allows the lower end to rise too high as he attempts to direct the discharge end under electric power lines, tree limbs, or beneath an obstruction in a barn. Blocking up the loading hopper to wagon level plus heavy bales approaching the upper end of the machine will cause it to become top-heavy and may result in upending.

Sometimes a farmer will purposely

upend his elevator. This may be intended as an "easy" and "quick" way to get at the discharge end of the machine for servicing — perhaps to lubricate, or adjust chain tension. A much less dangerous practice is to use the hoist to lower the trough to within reach. Don't risk an injury just to save a little time and energy.

When an elevator upends (Figure 2a), collapse may result if the upper member, B, of the undercarriage is not restrained to the trough by some means. If upending is accidental, there is a natural tendency for anyone working near the machine to try to stop it. A man may cling to the loading hopper. Or, he may position himself under the discharge end of the trough, thinking that he can keep it from hitting the ground too hard. Perhaps a man may grab a part of the undercarriage in an effort to keep the machine upright.

Such attempts have cost the lives of many farmers. An undercarriage collapse occurs too suddenly and unexpectedly, and the path of fall is unpredictable. A safety track which restrains the upper member of the undercarriage to the trough will prevent collapsing. Such a track will not permit separation of the trough from the rollers on the upper member of the undercarriage. It can serve also to limit travel of the rollers along the trough — restricting the discharge height to a safe level, and stopping the trough at a desirable height as it is lowered.

Is Your Elevator Top-Heavy?

An excessively top heavy condition will lead to upending and possible collapsing of the undercarriage. The point of attachment of the undercarriage can be moved further from the loading end

Safety Tracks Prevent

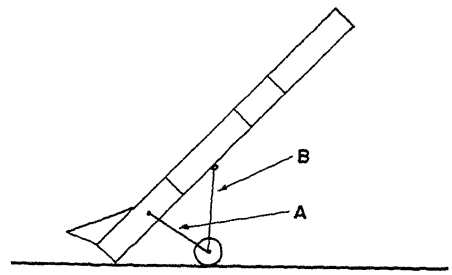


Fig. 1. Undercarriage construction of typical farm elevator. Member A is pinned to the trough frame. Member B is winched along trough frame to control discharge height.

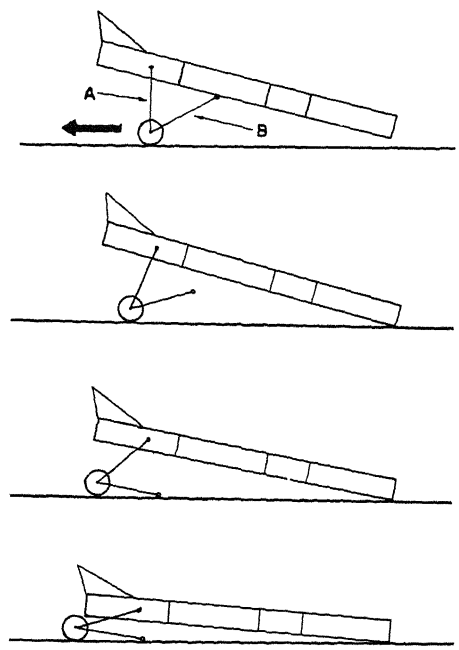


Fig. 2. The elevator in position (a) is about ready to collapse. The wheels will roll suddenly to the rear when member A of the undercarriage is directly over the axle (perpendicular to the ground).

ent Elevator Collapses

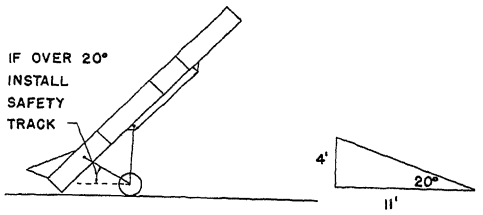


Fig. 3. When elevator is set in highest elevating position and the indicated angle is over 20 degrees, a safety track should be installed. The angle is 20 degrees or over when the conditions in diagram at right exist.

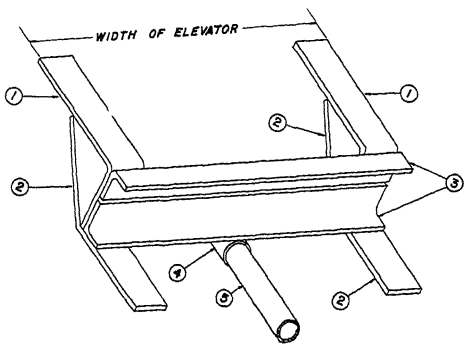


Fig. 4. A safety track with end supports to limit travel of member B (Fig. 1) is easy to make and install. This illustrates a six-piece support which can be welded together, then placed on the elevator trough-track. A pipe, "5," serves as the track between supports. Locate lower support at the lowest desirable position for member B. Hoist the elevator to 45 degrees and note the location of member B for upper support.

to reduce the top heavy condition. *This will not eliminate the hazards of elevator collapse.* If upended, the elevator will collapse sooner.

Shield Moving Parts

The speed of gears, chains, and rotating shafts on elevators is considerably less than on other machines. However, this does not mean that the chances of being injured by such moving parts are reduced. To the contrary, accident reports show that getting caught in rotating shafts is another principal cause of fatal accidents.

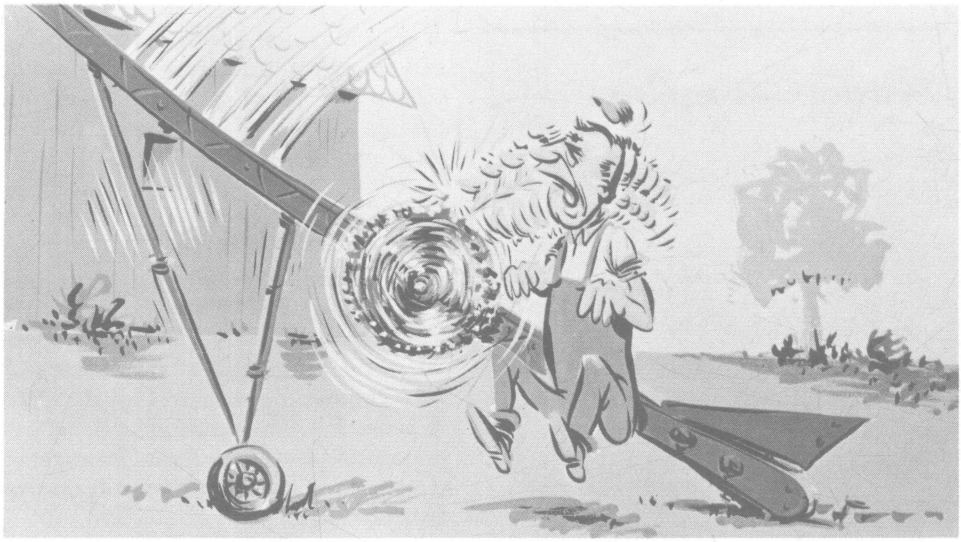
Make sure all drive chains and gears are shielded. Use a power-take-off shield if your elevator is driven with a tractor. It takes less than a minute to snap a power-take-off shield in place. That minute may prevent injury to you or a member of your family.

Is There a Fire Hazard?

Elevators equipped with engines frequently are built with the power unit located near the loading hopper. Hay leaves and straw chaff fall on the engine, restrict ventilation, and occasionally build up around the hot exhaust and muffler. This debris becomes very dry and is easily ignited.

Some engines are mounted so that the exhaust is directed at the bales being conveyed. Mufflers rust out rather quickly on small engines and are not always replaced. Absence of a muffler, where exhaust is directed at bales, is critical. Hot carbon particles may be exhausted and be deposited in a bale.

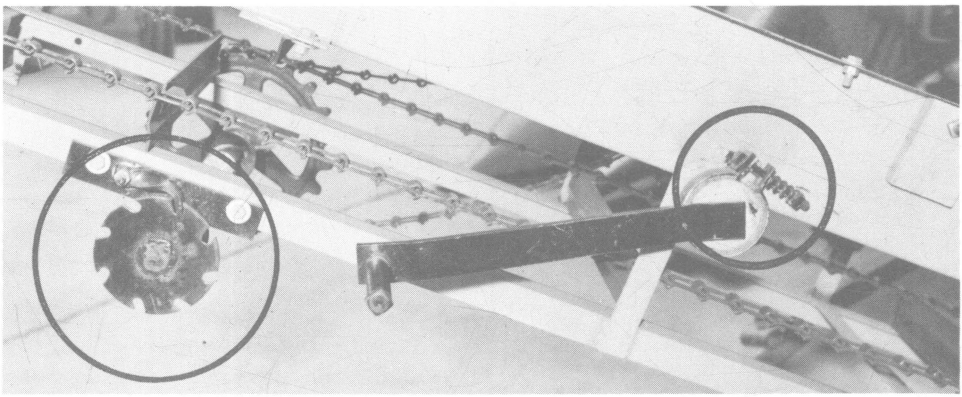
Imagine the problem if ignited hay leaves should be elevated into the barn — unnoticed. Protect the engine from falling leaves and straw. Direct the exhaust away from the elevator trough.



Watch Hoisting Cranks

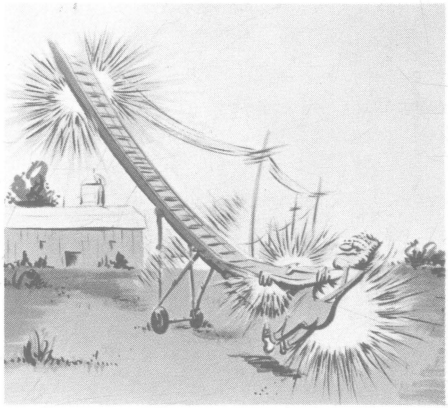
Most elevators are equipped with hand operated hoisting devices for adjusting height of discharge. While lifting or lowering these machines, it is not uncommon to lose control of the crank. When this happens, weight of the elevator will cause the crank to spin freely unless some automatic restriction is provided. Again, the natural tendency may be to try to stop the crank — if it hasn't hit you already. Many severe body injuries result from freely spinning hoist cranks. A number of children have received permanent facial injuries while playing with hoist cranks.

Some hoists of the worm gear design will even spin out of control. Check the action of the hoist on your elevator. You should be able to release the crank at any point while lifting or lowering,



Note braking device on this elevator hoisting crank. It prevents the crank from spinning freely. Also, a positive lock is provided (left) away from the path of the crank motion.

and it should not turn more than a quarter of a revolution without stopping. Whatever the means for controlling crank motion, it should be automatic. Don't rely on a pawl or some other device which must be engaged manually. Too often, manually operated locks are located in the vicinity of the spinning crank and cannot be reached once you lose control.



Avoid Electric Power Lines

Contact with overhead electric power lines by the elevator while it is being moved has proved fatal to operators. Move your elevator in a lowered position, and don't hoist it into power lines.

Use a tractor, where possible, to position your elevator. If you do contact a power line, *don't step off* the tractor during the contact. If the machine cannot be freed by pulling ahead or backing up, the operator should *jump free, not climb off,* the tractor. Then, avoid touching the tractor or elevator until electric power has been shut off. By all means, when power is on, never grasp the hoisting crank to lower an elevator caught in overhead electric lines, and never climb up the trough to free the lines.

Materials for One Track Support and a Track

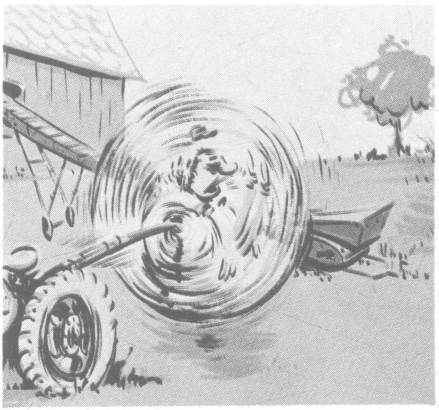
Part Number	Pieces Required	Material	Dimensions	Shape or Working Required
1	2	flat iron	2″ x 12″ x ¼″	Bend 90° 4½″ from end.
2	2	flat iron	2″ x 12″ x ¼″	Bend 45° in middle and weld to part 1.
3	2	angle iron	2″ x 1½″ x ⅛″ x elevator width	Weld to parts 1 and 2.
4	2	pipe	1½″ diameter x 3″ length	Weld to part 3 in middle.
5	1	pipe	1¼″ diameter x length required to reach supports	Pin or bolt to part 4, both ends.

Notes: (1) Weld or bolt supports to elevator trough frame.
(2) Design may need to be altered slightly for mounting on some elevators. The pictures shown on page 3 are examples of other types of safety tracks and supports.

PLAY IT SAFE

A few minutes spent checking your elevator and eliminating hazards may save personal injury and many hours of lost time. Think about these sources of danger. Practice safe operation. Make your elevator a safe hired hand.

- Add a safety track to your elevator if it is the type that may collapse (Figure 4).
- Fix the hoisting crank so that it will stop automatically if you lose your grasp of the handle.
- Repair or replace worn and frayed hoist cable.
- Shield all moving parts in the vicinity of the loading hopper — especially a power-take-off shaft.
- Shield engine from falling debris.
- Direct engine exhaust away from the elevator.
- Lower the elevator when moving it and when it is not in use.
- Keep elevator chassis level to avoid lateral tipping.
- Avoid upending an elevator unless it is lowered to transport position.



- Do not add extensions to the trough on your elevator without consulting the operator's manual.
- Never hoist your elevator higher than recommended by the manufacturer.
- Don't block up the wheels or axle to get greater discharge height.
- Don't use an elevator as a ladder or scaffold.
- Never let children climb on an elevator.
- Don't maneuver raised elevators near overhead electric power lines, unless the power is off.

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